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Title: Interventions to address household food insecurity in high-income countries

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Abstract

Household food insecurity is serious public health concern in high-income countries. Canada and the United States regularly monitor household food insecurity, while in other countries, such as the United Kingdom, it has been the rapid rise of food bank usage that has drawn increased attention to this longstanding, but largely overlooked, problem. This review evaluates evidence on interventions intended to reduce household food insecurity in high-income countries.

Research on social protection interventions suggests both cash transfers and food subsidies (e.g. the U.S. Supplement Nutrition and Assistance Program) reduce household food insecurity. In contrast, research on community-level interventions, such as food banks and other food programmes, suggests limited impacts. Though food banks have become a common intervention for food insecurity in high-income countries, evidence suggests their reliance on donations of volunteer time and food make them inevitably limited in the assistance they are able to provide. The stigma people feel using food banks may also make them untenable. Alternatives to, or enhanced, food banks such as community shops or community kitchens, have become common, but evidence also suggests they may be limited in effectiveness if they do not reach people experiencing food insecurity. This review highlights the difficulty of trying to address household food insecurity with community-based food interventions when solutions likely lie upstream in social protection policies.

Defining and measuring household food insecurity

Defining a problem and operationalising measurement of a problem is critical for understanding intervention. Thus, this paper begins with a brief review of the definition and measurement of household food insecurity used in the United States, which is widely used for assessments of food insecurity interventions in high-income countries.

In the nutrition community, food insecurity is often defined as “the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (1). This definition, established by the American Institute of Nutrition, was based on findings from studies of low-income families whose descriptions of hunger highlighted the multi-dimensional nature of food insecurity and the unique ways it could be experienced by different members of the same household and over time (2, 3). Since then, numerous studies have identified common core dimensions of food insecurity in different populations, which reinforce these early themes (4-8). First, there can be a quantitative dimension, where households run low on food supplies, don’t have enough food to eat, and go without eating (2). A qualitative dimension describes changes in diets and food supplies, characterised by restricted variety and monotony as well as not being able to meet perceived needs for a balanced diet and for inclusion of healthy foods. A psychological dimension includes feelings of uncertainty and anxiety about food supplies and feelings of deprivation and lack of choice. Lastly, the social dimension of food insecurity is characterised by modifications to food practices, such as acquiring foods from charitable sources or stealing, being unable to maintain socially prescribed ways of eating (e.g. three meals a day), and being unable to participate in social food practices (e.g. having friends over for a meal) (2). For some, food insecurity may be specifically connected to a point in time (e.g. following job loss), but others described the experience as recurring monthly (e.g. prior to receiving a monthly income payment) or a constant experience of worry and insufficient money for food (5-7).

From these descriptions, the notion of food insecurity as a graded experience or continuum emerged, where anxiety preceded actual depletion of food supplies, followed by qualitative and then quantitative changes to diets, experiences of hunger, and, most severely, going without food (2). Variability in timing and manifestations of the experience also highlighted the need for a

multi-item measurement tool, as no single description or possible manifestation of the experience was sufficient to capture the underlying core construct.

Importantly from a nutritional sciences perspective, the experience of food insecurity is not interchangeable with malnutrition, inadequate dietary intakes, nutritional deficiency or poor dietary quality, though these are possible outcomes of food insecurity (1). Similarly, ‘hunger’, as biologically defined (i.e. “the uneasy or painful sensation caused by a lack of food”) is not food insecurity and food insecurity can be experienced without hunger. Household insecurity is key indicator of nutritional state, but should be used alongside population monitoring of nutritional status (1).

Based on these qualitative studies, the United States Department of Agriculture (USDA) Household Food Security Survey Module (HFSSM) was developed to measure household food insecurity in the population (9). Extensive work was undertaken by the USDA to test different indicators of food insecurity, resulting in the selection of 10 questions that reference the household food supply, general experiences of adults in the household, and specific experiences for an adult respondent. An additional eight questions were also added to the module to assess experiences of food insecurity among children who are under 18 years of age, based on an adult’s report (10). The experiences defined in the scale items range in severity from worry that food will run out, not being able to eat balanced meals, cutting the size of meals or skipping meals, and feelings of hunger but being unable to eat. Questions at the most severe end of the scale ask the respondent if the respondent and if any children in the household went a whole day without eating. All questions make reference to the past 12 months and specify that experiences were due to a lack of finances for food. The latter clause is important for reducing the likelihood that experiences of reduced food intake for other reasons, such as dieting or time restraint, are reported (9). The order of questions reflect the idea that food insecurity is a continuum. Though a critique of the USDA scale, and related measures, is that it focuses on insufficient access to food (11), it arguably captures the critical concern of households not having enough food, reducing the risk for false positives (12). The quantitative focus of the scale is a particular strength for evaluating interventions aimed at ensuring that everyone in the population always has enough food to eat.

Household food insecurity in high-income countries

Since the development of the HFSSM, household food insecurity has been measured in national surveys, though the ability to make comparable estimates across different countries is limited by different thresholds for food insecurity. In the United States, food insecurity is monitored in the Current Population Survey and a national health survey. Based on a threshold of three or more items affirmed on the HFSSM, over 12% of households in the U.S. are food insecure (13). In Canada, where food insecurity is measured in the national health survey, approximately 8% of households are food insecure using similar thresholds to the U.S. When marginal food insecurity is included, referring to one item on the adult scale and/or one item on the child scale, over 12% of Canadian households are classed as food insecure (14). Food insecurity using items from the HFSSM has also been measured in national health surveys in Portugal (15), Australia (16), and recently, in a survey across England, Wales, and Northern Ireland (17).

For the most part, a scale like the HFSSM has not been adopted to measure food insecurity in the EU, though single item indicators of food hardship are often included as part of larger scales used to measure material deprivation (18, 19). While these items capture the inability to afford to health eating patterns (e.g. inability to afford to eat meat, chicken, or fish every second day), they do not capture psychological or quantitative dimensions of going without food or of food running out, and do not specify the time period or frequency of experiences.

Food insecurity in relation to measures of nutritional intake, health and well-being

While a comprehensive review of the health outcomes associated with food insecurity cannot be covered here, along with a moral imperative for food insecurity interventions, there is also a health imperative to intervene. Individuals living in food insecure households have poorer dietary and nutritional intakes than those who are not, though there is variation across age and sex groups (20-26). Food insecurity has also been associated with diet-related chronic conditions, such as diabetes, metabolic syndrome, and obesity, potentially because of its impact on dietary quality (27-32), and has also been associated with elevated markers of low-grade inflammation (33).

Experiences of food running out and going without food also impact mental health and social dynamics. Poor mental health, psychological distress, and diagnoses of depression and anxiety among adults have consistently been found to be elevated among people experiencing food insecurity (34-36). Relationships may be bidirectional, as deterioration in mental health has been associated with transition into food insecurity (37), and food insecurity has also been observed to precede depression outcomes (38, 39). Studies have also suggested that food insecurity can impact on parenting, such as increasing risk of feelings of frustration toward children, depressive affect, and reduced sensitivity to the infant's cues and response to distress (40, 41). Qualitative studies among children suggest they can recognize and experience the stress of food insecurity, even when parents try to protect them from knowing of their struggles (42, 43). Childhood experiences of hunger have been found to associate with poor physical and mental health into late adolescence (44).

Determinants of Household Food Insecurity

Reflecting the central importance of income in determining a household's financial ability to acquire food, data from the national surveys have routinely shown household income to be the most consistent and strongest predictor of risk of food insecurity (45-52). But beyond an annual measure of income, other measures of financial resources also matter, such as access to household savings and income volatility. Using data from the Survey of Income and Program Participation, Leete and Bania observed that negative deviations in the month of observation from mean monthly incomes over the past 12 months were associated with food insecurity for that month (49). Persistent poverty has been found to associate with food insecurity (53), possibly because it results in accruing debt and an inability to save, exposing households to income insufficiency and income shocks (49). Households without liquid assets have been shown have higher risk of food insecurity than households with liquid assets (47, 48).

Many population subgroups who suffer from deep and persistent poverty have high rates of food insecurity. These include households with children, lone parents, adults with lower levels of education, households receiving welfare benefits, people belonging to Aboriginal groups, and in the United States, ethnic minorities (13, 52, 54-57). High rates of severe food insecurity have

been observed among people who are homeless, people seeking help from food banks, people with addictions, and people with HIV, among other vulnerable populations (58-66).

Poor health may put individuals at risk of food insecurity, even in countries with public healthcare systems. The odds of food insecurity has been found to increase with the number of chronic health conditions among adults in Canada (52). Health conditions were particularly potent predictors for severe food insecurity, where households were more likely to experience severe food insecurity in comparison to moderate food insecurity if the survey respondent had two or more health conditions after adjustment for income and other socio-demographic variables. These findings are aligned with longitudinal studies from the United States that have found transitions into poor health to associate with transition into food insecurity (37).

Thus, in addition to income, it is crucial to understand demands on household resources, such as managing a health condition and medical expenses. Housing costs are also a major expenditure, and unaffordable housing has been associated with food insecurity (67, 68). While there have been few empirical analyses of how the cost of food relates to household food insecurity, rising food inflation has been associated with rising report of an inability to afford food in Europe (69), and across the United States, variation in food costs have been associated with food insecurity (70).

In addition to explaining household food insecurity from a financial resource perspective, researchers have sought to identify other factors that may increase risk of food insecurity among low-income households. These include studies that have suggested poor financial management skills or food skills may increase risk of household food insecurity (71, 72). The cross-sectional nature of these studies highlight the need to examine these factors longitudinally, as assumptions that these factors precede food insecurity may be misguided. For example, in an analysis of families from the Survey of Household Finances and Childhood Obesity based in the United States, Gundersen (72) used self-reports of “paid bills on time”, “always pay credit card in full to avoid interest” and “confidence in financial management ability” as indicators of a construct named “poor financial management”. It is likely that the experience of food insecurity would make one doubt their ability to manage their household finances, however, and delaying bill payments is one resource augmentation strategy families use in the face of running out of money

for food (73). The authors found that “use of a budget”, one measure that likely impacts the amount of food that households can purchase with limited finances, did not significantly differ between food secure and food insecure households in this study (72). Similarly, studies documenting lower complexity of at-home meal preparation among food insecure individuals likely reflect limited resources available for complex meal preparation (74), rather than poor skills leading to food insecurity. Studies of the experience of food insecurity have highlighted the importance food insecure individuals place on careful budgeting, looking for sales and using coupons, and cooking from scratch to make their limited finances stretch farther (5, 74, 75). These skills, however, do not make up for the insufficiency of their finances for food, nor do they protect individuals from feeling anxiety about their household food supplies. A recent analysis of food skills among food secure and food insecure households in Canada showed no difference in self-rated cooking ability between food secure and food insecure households, and 84% of food insecure households reported shopping for food with a budget, highlighting the careful attention paid to their finances. Among food secure families, only 43% shopped with a budget (76).

There has also been interest in whether a lack of food availability in poor areas contributes to food insecurity beyond household level financial resources (77). “Food deserts” refer to the poor neighbourhood availability and affordability of healthy food. They are characterised as neighbourhoods that lack supermarkets within a defined radius or neighbourhoods that have only shops that sell food at higher prices or of limited quality and variety (78). Dwelling in a food desert has been hypothesized to relate to household food insecurity by requiring travel to supermarkets, therefore restricting access to food by imposing physical inability to obtain it, or by requiring money for transportation to reach it. Reliance on local shops which may sell food for higher prices is also thought to reduce the amount of food that households can acquire. However, studies examining food access and rates of food insecurity have shown conflicting results. Community-based studies in low-income neighbourhoods have found that most food insecure households do not consider access to food shops to be a problem (79), suggesting that distance to grocery stores is not a primary driver of food insecurity (80), though these findings are context-specific. Assessing how households shop is critical to understanding how local access impacts food insecurity and nutrient intakes, however, as assessments of local food

landscapes disconnected from resident experiences may incorrectly point to place-based interventions that are not relevant to low-income residents (81).

Household Food Insecurity Interventions in High-Income Countries

For this review, interventions are classed as any programme or policy aimed at addressing household food insecurity, from ensuring that households no longer worry about their food running out, to not compromising qualitative aspects of their diets, to not having to go without food. These include social protection policies aimed at ensuring households have the financial means to meet their basic needs and food-specific social security interventions, namely the Supplemental Nutrition Assistance Program (formerly food stamps) in the U.S. This programme provides money loaded onto a payment card, which can only be used to purchase eligible foods (82). Food banks (or “food pantries” in the U.S.) provide free groceries to people who seek their assistance, also aiming to ensure households do not have to go without food. Often framed as alternatives to food banks, community food programmes aim to reduce household food insecurity by teaching skills to make limited household food budgets stretch farther, provide access to places to grow food, or provide cheaper access to food, through community shops, market voucher schemes, or food box programmes.

Not included in this review are programmes that aim to meet day-to-day hunger needs through the provision of free meals to individuals. While these may have household impacts (83), they were out of the scope of this review. They often target specific vulnerable populations, such as people who are homeless and who may be struggling with addictions or mental health issues, or elderly and/or disabled people, in the case of Meals on Wheels, or low-income children (e.g. free school meals, breakfast clubs). For reviews and recent papers on these types of interventions, see Lambie-Mumford and Sims (84), Campbell et al. (85), Ralston et al. (86) and Pettes et al. (87).

Social protection and food insecurity

The United States has a long history of running food-specific social security programmes. Originally tied to agriculture surpluses and then enlarged and reformed in response to a strong anti-hunger lobby (88), the Supplemental Nutrition Assistance Program (SNAP; formerly food stamps) is a programme targeted toward ensuring households do not go without food. It is a

means-tested entitlement programme and eligibility criteria require households have no more than \$2250 USD in saving and assets, a gross monthly income at or below 130% of the poverty line (about \$26,000 per year for a three-person family), and a net income equal or less than the poverty line (about \$20,400 annually) (82). Given the highly selective criteria to qualify for the programme, many studies have observed high rates of food insecurity among recipients (89). This creates a methodological challenge when evaluating programme effectiveness. To address it, selection bias must be accounted for in analyses aiming to identify the effect of programme participation on food insecurity. In general, studies that have accounted for these methodological issues have found that participation in SNAP is associated with a significant decline in food insecurity (45, 90-93). One recent example is an analysis of data from a novel survey of SNAP participants by Malbi and Ohls (94). Here, the authors compared rates of food insecurity among new entrants into the programme with those who have been receiving SNAP for six months or more, as well as examining food insecurity outcomes in a longitudinal sample. They found that food insecurity was significantly reduced by about 4 percentage points in the cross-sectional sample and 11.1 percentage points in the longitudinal sample. Severity of food insecurity was also considerably reduced (94). However, though studies have shown a significant decline in food insecurity prevalence, even after intervention, rates of food insecurity among SNAP recipients remain high. This suggests the level of SNAP support and potentially the programme's administration (95) are not sufficient to prevent food insecurity among recipients. Others have argued that the paternalistic nature of SNAP reduces its effectiveness and do not allow households to maximise their own utility (88).

Given that income and other measures of financial resources are most consistently associated with food insecurity, a key question is whether income transfers reduce food insecurity. Most high-income countries provide social security for households and children with low incomes in the form of cash transfers, including means-tested income support, tax credits, and universal benefits, such as child benefits. A handful of studies have evaluated how these programmes impact food insecurity, also employing econometric techniques.

In Canada, a difference-in-difference approach was used to examine the effect of an introduction of the 2006 Universal Child Care Benefit, a monthly income supplement of \$100 for each child

under six years of age across Canada (96). Comparing eligible families to those without eligible children, the authors estimated that introduction of the child benefit reduced food insecurity by 2.4 percentage points, or about 25%. The effect was stronger when the analytic sample was restricted to households with incomes below median income. Also from Canada, Milligan and Stabile examined how generosity of child benefits related to a number of child outcomes, including parents' reports of their child ever experiencing hunger (97). Using a stimulated benefits approach, whereby variation in benefit eligibility across provinces and over time was used as an instrument for actual benefits a family was eligible for over 1994 to 2005, they found that there was a significant decrease in the probability of children experiencing hunger as the value of benefits increased. Other studies have evaluated food insecurity rates among households receiving social assistance over periods of investment in cash transfer programmes and other poverty reduction interventions, finding significant reductions in food insecurity for these households during these periods, also suggesting food insecurity is responsive to expanded social security programmes in Canada (98, 99).

Natural variation in welfare policies has also been used to evaluate the relationship between non-food safety net programmes and food insecurity across states in the U.S. For example, Schmidt et al. examined the individual and combined effects of food-related (e.g. SNAP and National School Lunch Program), non-food social security programmes (e.g. cash welfare programmes that support low-income families, disabled people, and low-income working families) and public health insurance, on food insecurity among lone-parent families (100). They also used simulation eligibility instrumental variable approach, examining how the average programme generosity in each state-year for each demographic group related to household food insecurity. This overcomes the selection effects of there being more families eligible for benefits and more food insecurity during difficult economic times. They found that increasing a family's combined income and food entitlements by \$1000 USD reduced food insecurity by 1.1 percentage points. They also examined the independent effects of food-based, cash-based, and public health insurance programmes, and found that there was no evidence that food-based programmes were more effective than cash-based programmes; both were associated with a decline in food insecurity. The results were inconclusive for public health insurance.

Another element of many countries' social safety nets are state pensions. In Canada, the Old Age Security pension is a universal provided to all senior citizens aged 65 and older, and Guaranteed Income Supplement is an additional cash transfer for low-income seniors. Combined, these cash transfers are significantly more generous than support for working-age low income people who are out of work. By exploiting differences in eligibility between cash transfers before and after pension age, McIntyre et al. showed how comparable individuals have significantly lower food insecurity once they are of pension age and eligible for state pensions (101).

In light of evidence that unaffordable housing and health conditions are associated with food insecurity, the provision of universal health care and subsidized housing or housing benefits may also impact food insecurity. To the author's knowledge, there are few studies that have focused on these, likely due to the lack of data and difficulty evaluating policies that vary cross-nationally rather than within countries. One example is a recent study of social protection spending across Europe, which broadly captures the cumulative generosity of interventions that provide cash benefits and in-kind transfers, including housing subsidies. Using EU Statistics on Income and Living Conditions data, which include a measure of self-reported inability to purchase meat, chicken, or fish (or vegetarian equivalent) every other day as a proxy for food insecurity, Loopstra et al. found that during the Great Recession in Europe, in countries where there were low levels of per capita investment in social protection spending, increasing unemployment and declining wages were associated with rising food insecurity, whereas this was not the case where social protection spending was high (102). Spending on housing, in particular, had a strong buffering effect on the relationship between rising unemployment and food insecurity. In contrast, many studies exploring food insecurity and social housing have found high rates of food insecurity among household living in social housing, which likely reflects the selection of vulnerable households into this type of housing (68, 103). Studies exploring the expansion or reduction of the provision of affordable housing on food insecurity would enable examination of the effects of this type of social intervention on food insecurity.

In summary, investment in a variety of social protection interventions has been shown to reduce food insecurity. Given that these policies are most often implemented at the population level, the effects of such policies translate into large reductions in the number of households experiencing

food insecurity and potentially reduce spill-over costs of food insecurity to other areas of state spending (i.e. healthcare) (104).

Food banks (or food pantries) and food insecurity

Given the evidence that investment in social security and expanded welfare entitlements can protect households from food insecurity, periods of welfare retrenchment have often been characterised by the rise of charitable food provisioning in the form of food banks as communities have sought ways to respond to growing hunger in their midst (105-108).

A food bank (called a food pantry in the U.S.) is a place where individuals can go to receive groceries free of charge. There is important variation in food bank operations across and within countries, but common features of food banks in Canada, the U.S., Australia, have been reviewed in order to evaluate their effectiveness in addressing food insecurity (e.g. 109). Common features include a reliance on donated food, either from the community or from surpluses donated by the food industry; a reliance on volunteers, though many food banks employ staff as well; and their extra-governmental nature, meaning they are not directly run by government, though they may receive governmental in-kind support or grant funding.

Food banks aim to prevent people from going hungry, however, studies evaluating food banks across different dimensions suggest they are largely unable to meet this aim. First, the levels of need observed among food bank users suggest they experience high levels of severe food insecurity, which is often recurrent in the context of food bank use (62, 63). An early study of women using food banks in Toronto by Tarasuk and Beaton (65) observed that despite regular food bank use, there was a high prevalence of severe food insecurity among study participants (70%). Over a 30-day period, experiences of hunger were reported by 57% of participants, even in the context of food bank use. So while in some studies respondents have emphasised that the food provided to them from food banks is an important supplement to otherwise depleted or non-existent food supplies (5, 110-112), the amount and regularity of help provided from food banks may be insufficient to ensure households do not go without food.

To the author's knowledge, intervention trials evaluating before and after effects of receiving help from food banks have not been conducted, and few studies have followed people using food

banks forward from the point of food bank use (63). One recent example by Roncarlo et al. (113) examined change in food insecurity over one year in a cohort of people who started using food banks within six months of recruitment. They reported that after one year, food insecurity was significantly reduced, and attributed this effect due to the food bank intervention. However, attributing the observed decline in food insecurity to food bank use could have been erroneous for several reasons. The study lacked a true baseline measure (i.e. before receiving help from food banks) and how often households were receiving this kind of assistance over the year of follow-up was not taken into account. There was a high attrition rate (more than 50%), and omitted variable bias is likely, as employment increased in the sample but was not accounted for in statistical models. Income was only adjusted for using a categorical variable, which was unable to capture changes in income in the magnitude of \$5000 or less. There was also no control group, so it is impossible to know if the change observed was in accordance with a time trend in food insecurity in this community over this period. Lastly, there are selection effects that must be accounted for. Households that experienced serious declines in their circumstances may be harder to re-contact, thus biasing the follow-up sample towards those that did better over the year. This work highlights the need for well-designed studies to examine the impact of food bank use on food insecurity. While food banks have proliferated in many high-income countries (114), most recently in the UK (108), they have done so in the absence of well-designed evaluations of their effectiveness.

Studies exploring the nature of food bank operations and quality of food distributed highlight why they may have limited effectiveness. For example, an in-depth study of food banks operating in Toronto showed that the functioning of food banks was highly contingent upon donations, resulting in assistance that was highly variable and unresponsive to users' needs (115). Food banks were open for only a limited number of days and times and had to ration the amount they gave away to make food supplies stretch farther, thereby further disassociating client need from what was received (115). Studies across Canadian cities have also documented serious limitations in the amount of food and quality of food distributed, including foods that were past best before dates, highly-processed and superfluous, and quantities that would only provide for 1-3 days' worth at most (116-120). Other concerns about the limited nature of food banks for vulnerable populations have come from the medical community. Based on a survey of

food pantry programmes operating in New York City (121), it was found that programmes were inaccessible due to few operating hours and entry requirements, and that the lack of variety and quantity of foods provided likely meant the programmes would not be able to meet the needs of medically underserved patients.

Reports on the nutritional inadequacy of foods provided from food banks are common (109). A recent review of studies that have examined the nutritional quality of foods provided through food banks. It found that while there was wide variability in the nature and amount of food provided, in general, studies reported insufficient amounts of fruit and vegetables and milk products, and insufficient amounts of calcium, vitamin A and vitamin C (109).

Importantly, studies among food bank users have documented feelings of shame about having to use food banks (65, 122, 123). These findings raise questions about whether food banks can address food insecurity, as receiving help from a food bank means acquiring food in a socially unacceptable way (108). Stigma and shame may explain why there is evidence that food banks are only used by less than one-quarter of the food insecure population in Canada (124).

Examination of reasons why households don't use charitable food assistance, even in the context of severe food insecurity, suggest that food banks are considered an intervention of last resort and that households endure going without food rather than turning to charity (63).

Cumulatively, research on food banks from high-income countries, suggests that charitable food provisioning through food banks is inherently limited in its ability to meet the needs of individuals and households experiencing food insecurity, and at a population level, has done little to impact the widespread problem.

Community food programmes

In light of the limitations of charitable food provisioning through food banks, organisations have often sought alternative ways to provide no-cost or low-cost food to people and/or enhance the types of services offered at food banks. Sometimes referred to as community food security activities, these have been positioned as sustainable alternatives to charitable hunger programmes like food banks, which have been viewed as “treatment” and “social welfare” (125). These initiatives can take different forms. Some food banks in the UK and Canada offer additional

programmes (e.g. www.trusselltrust.org/what-we-do/more-than-food/) or operate as a part of a community food centre” (e.g. cfccanada.ca/what_is_a_community_food_centre), where people can receive additional services such as benefits counselling with a caseworker, debt counselling, cooking classes, or fuel vouchers, or participate in community kitchens or community gardens. Another model is the community shop, which through a membership structure (possibly operated through volunteering time or a low membership fee), members make their own choices from the donated or surplus foodstuffs available.

Martin et al. (126) examined a combination of these services in a randomised intervention design, where clients using a regular food bank were compared to food bank clients who were offered a Freshplace membership. The Freshplace intervention allowed members to choose their own food, much of which was fresh and perishable, and included motivational interviews with a project manager, and additional services and referrals. The authors reported that, at some but not all points over the follow-up period, the odds of severe food insecurity among Freshplace compared to those receiving help from a traditional food bank were significantly reduced, while self-sufficiency scores and fruit and vegetable score were significantly increased. Given the combined nature of the intervention, it was not clear what aspect of the intervention was most effective, and drop-out rates were not reported. Participants were also allowed to switch their intervention group, which means randomisation was not perfectly achieved, potentially biasing results. However, the results suggest that one-on-one counselling, greater food choice, and membership-based models may be more effective at meeting the needs of food insecure people than traditional food banks.

Community kitchens are another form of community food programme. Programme participants prepare large amounts of food together and take home the meals prepared, and simultaneously often are taught budgeting and cooking skills (127). In a review of research on community kitchens across high-income countries, Iacovou et al. (128) found a variety of methods have been employed to investigate their effectiveness. These included participant observation, questionnaires (cross-sectional and pre/post), interviews and focus groups. Most studies were small and descriptive. The main themes that emerged across the studies reviewed were an increase in reported intake of nutritious foods and increased healthy food access, increased self-

reliance and engagement with social services, improved social skills and enhanced social support, and increased skills, confidence, and enjoyment from cooking (128). However, in an evaluation of the experience of people using a community kitchen programme in Canada, Engler-Stringer and Berenbaum noted the tenuous nature of any benefits provided to programme users since programme availability was subject to holiday schedules, funding constraint, and time allotment of staff (129).

Largely absent from evaluations of these types of programmes are objective, pre- and post- test evaluations of how programmes relate to household food insecurity, though even this type of evaluation can be biased to retain participants who derive the most benefit if people who discontinue use are not followed. There are few studies that have used a randomised trial design and followed participants over a longer period of time. One exception is a recent evaluation of the SNAP-ED programme in the United States, which offers a nutrition, budgeting, and lifestyle intervention education programme (130). This study showed that in the 10 weeks after baseline, the reduction in food insecurity was the same for both the control and intervention group, which may have been due to the financial compensation received by both groups for participating. After one year, food insecurity scores were significantly lower in the intervention group, though this was driven by a greater rate of rebound to baseline scores for the control group rather than a further reduction in food insecurity for the treatment group. This suggests the programmes could buffer families from a decline in food insecurity in the face of economic shock or other drivers, rather than cause a decline in food insecurity. In the intervention group, only 41% were fully food secure one-year after the intervention, suggesting its effects were not powerful enough to move all households into food security. The dropout rate was also 43%, which may mean those who were deriving the most benefit from the programme were more likely to stay enrolled in it.

Community food programmes also often focus on improving food availability and improving food skills. For example, reflecting concern about food deserts, some programmes focus on providing alternative places for people in low-income areas to buy or acquire food by establishing mobile, low cost fruit and vegetable markets, fruit and vegetable box drop-off programmes, or community or allotment garden spaces for people to grow food (131). Funding

and provision of these programmes can be through third sector organisations, government (particularly local governments if public health is devolved), or both.

These programmes have also largely not been evaluated in randomised intervention designs. An examination of the impact of a subsidized fruit and vegetable box programme (e.g. Good Food Box programme) compared the food insecurity and dietary quality of individuals participating in the programme to those not participating and those who had dropped out of the programme (132). It was found that those enrolled in the programme had a lower prevalence of food insecurity than those not participating at baseline, and there was a non-significant increase in food insecurity among those who discontinued use of the programme over the follow-up period was reported (132). Rather than highlight the effectiveness of programme use for reducing food insecurity, these findings may indicate that those with deteriorating circumstances were not able to remain in the programme. Further, over the eight month follow-up period, the prevalence of food insecurity among the 46 individuals that remained in the programme and completed both questionnaires was unchanged (132).

This raises the problem of reach, relevant to many community food programmes as well as food banks. While programme benefits can be documented among participants, how programmes impact the prevalence and incidence of food insecurity in communities is often not discussed. Even if a large effect size is observed, if only a small subset of the food insecure population is ever inclined or able to maintain sustained participation in these programmes, a wide-scale reduction in food insecurity at the population will not be achieved. When use of community kitchens was explored in a Toronto-based sample of low-income families with children, only a very small proportion of families participated in these initiatives, and many reported not participating in them because they did not feel in need of such a programme (133). In addition, children, employment, disability, social interaction disorders, and lack of transportation may all reduce the ability of households vulnerable to food insecurity to participate in these programmes.

Researchers have also raised concerns about community food programmes being positioned as initiatives to address food insecurity because they focus on skills, behaviour, and physical food access, which have not been empirically documented as drivers of household food insecurity.

Focus in these areas may serve to draw attention away from systemic drivers of insufficient finances for food (127, 134-137).

Future research on household food insecurity interventions

After reviewing evidence to date on food insecurity intervention, a key question is why this problem remains so persistently high in the United States and Canada and seems to have risen in recent years in some countries in Europe (102). Here, cross-country comparisons are particularly helpful. Though not intervention study designs, differences in prevalence rates between countries and differences in trends over time point to population drivers of the problem that may not be evident when examining variation between households within countries (138). Here, some research suggests that the overall set of policies captured by measures of social protection spending and welfare state regime typologies explain cross-country differences in food hardship, suggesting that while small changes in prevalence can be made at the margins, a major shift social welfare policies, which include a range of interventions covering housing, child care, healthcare, income security, and job security, are needed to shift the prevalence of food insecurity (69, 102, 139). Cross-country comparative research on household food insecurity is rare, but new data from the Food and Agriculture Organisation collected by an experience-based measure of food insecurity in the Gallup World Poll over 140 countries may provide new opportunities (4).

Conclusions

Household food insecurity is experienced by significant numbers in high-income countries, and is a serious concern for health and wellbeing. While efforts at the community level, in the form of food banks and community food programmes attempt to alleviate this problem, there is lack of evidence showing that these programmes effectively reduce food insecurity. Importantly, even if they can have positive effects, they may not reach many people who experience food insecurity. On the other hand, public policy interventions have been shown to reduce food insecurity and reach large numbers in the population. Governmental efforts to expand investment in social protection in high-income countries would likely further reduce food insecurity and may have

long-term benefits for reduced spending on healthcare and other expenditures resulting from the harms of food insecurity.

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